

ORIGINAL ARTICLE

STUDIES ON THE MORPHOMETRIC DATA OF THE *Pheropsophus hilaris* (COLEOPTERA: CARABIDAE).

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ABSTRACT

Insects make up the largest and most diverse group of organisms on earth, contributing to as much as 80 - 90% of the world's biodiversity. Approximately 950,000 species of insects have been described; some estimate there are 4,000,000+ species in total most authorities agree that there are more insect species that have been described (named by science) than there are insect species that have been previously named. Conservative estimates suggest that this figure is 2 million, but estimates extend to 30 million. In the last decade, much attention has been given to the entomofauna that exists in the canopies of tropical forests of the world. *Pheropsophus hilaris* is a bombardier beetle of the order Coleoptera and is in the family Carabidae. In the world, some 900 thousand different kinds of living insects are known. In this study the morphometric study are shown to be quite complex this complexity could suggest an origin by design.

Keywords: Coleoptera, Conservative, Bombardier, Morphometric, Biodiversity, Tropical, Entomofauna.

1. INTRODUCTION

Pheropsophus hilaris is a bombardier beetle of the order Coleoptera and is in the family Carabidae. It is the representative species of its genus. They are often found around on sandy flood plains rotting wood, stones, wooden logs, bricks and debris. The adults are nocturnal and primarily carnivores that prey on other insects, particularly crickets (Dean *et al.*, 1990). They also fed on some plant matter and fruits as well. During the day they hide under debris such as rocks and logs. Their body and legs appear to be well adapted for the mode of running life (Eisner *et al.*, 1999). Body is large and elongated black in colour with yellow bands. Head including eyes narrower than Pronotum. Head is rectangular glabrous and shiny. Antennae eleven segmented and inserted between eyes and base of mandibles (Frank *et al.*, 2009). Pronotum is graduate yellow and black stripes both in anterior and posterior sides. In male the Proximal three Prosternal segments are dilated and appear relatively larger than distal segments. In female, all the Prosternal segments are comparatively uniform in size. The ovipositors become visible in the female, normally the adult female with a broad abdomen is slightly larger than the male.

2. MATERIALS AND METHODS

Adult insect *Pheropsophus hilaris* were collected from the rearing cage. The length and width of different parts of the body were calculated, Student's 't' test was applied to find out the Morphometric data (Sokal and Rohlf, 1981).

3. RESULTS AND DISCUSSION

The bombardier beetle has been a subject of interest for many years. This beetle is called as 'bombardier' because it ejects a hot, highly noxious spray of aqueous benzoquinones, oxygen and steam as a defense mechanism against would be – predators. The secretion is very accurately delivered via twin sets of spray nozzles located at the tip of the beetle abdomen and is most effective at stunning predators. They live under rocks or pebbles in cool, sandy soil (Schnepf *et al.*, 1969).

There exist several different types of bombardier beetle, which employ slightly different types of defensive structures and chemistry but generally the same method of defense – shooting at predators when threatened and then running away. Most bombardier beetle exist in the family carabidae, and within the family are three subfamilies: brachinae, metriinae and paussinae.

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An early – recorded observation of these beetles was made in 1839, by the entomologist O.J. Westwood, who quoted a traveler returning from south America. He wrote that large beetles of the genus *brachinus* on being seized immediately play of their artillery, burning the flesh to such a degas, that only fen specimens can be captured with the naked hand (Brown, 1954). Most noticeable, is the force of the spray, which is ejected during the chemical reaction (Anon, 1990; Nakataui *et al.*, 1996). Have found that the spray is ejected in explosive discharges of about pulses per second, which can surprise and deter large vertebrates even frogs (Brower, 1984). And can even send some attackers into seizures. One study records the velocity of the spray to be within a range of 325 to a stunning 1950 cm³ (Arthur, 1996). Additionally, the beetle’s spray is astonishingly hot, a feature that seems to be dependent on the biochemistry of the reaction between the hydroquinones, hydrogen peroxides and the catalyses and peroxidases that the beetle synthesizes and stores in separate reservoirs (Andrews, 1929).

Freshly emerged grubs appear to be white in colour and later it turns into brown. they are very active and they exhibit nomadic behavior (Aneshansley *et al.*, 1969). The length and width of the body of the fist instar grab ranges from 5.00 to 5.70 mm and 2.20 to 2.60 mm respectively. However, the

average body length and width ranges from 5.50 mm and 2.50 mm respectively (Bhat and Rajagopal, 1988). The grab takes a period of 7 to 10 days to complete its growth. The body length and width of second instar grab are found to be 6.00 mm and 3.20 mm respectively. The grab takes a period of 19 to 21 days to complete its growth. The period of the third instar grab ranges from 30 – 40 days. The grab finally develops into a pupal instar and the pupal period varies from 10 to 12 days (Fig 1 & 2). The adult insect has an elongated large black body with yellow band markings. The adult female masques about 21 mm in length while the adult male of the same age is slightly smaller in size and it measures about 18 mm in length (Sokal and Rohilf, 1981).

Table 1: Morphometric data of the adult male and female *Pheropsophus hilaris*

S. No.	Characters	Male (mm) Mean ± S.E	Female (mm) Mean ± S.E
1	Length of the head	3.12 ± 0.022	4.15 ± 0.001
2	Width of the head	2.40 ± 0.018	3.02 ± 0.012
3	Length of the antenna	7.25 ± 0.006	8.90 ± 0.021
4	Length of the thorax	2.75 ± 0.001	3.45 ± 0.014
5	Basal breadth of thorax	2.00 ± 0.001	2.50 ± 0.012
6	Length of fore wing	8.40 ± 0.009	9.90 ± 0.014
7	Width of fore wing	3.20 ± 0.009	4.05 ± 0.001
8	Length of hind wing	14.40±0.015	16.80 ± 0.022
9	Width of hind wing	6.25 ± 0.009	7.50 ± 0.001
10	Length of fore leg	10.45±0.018	12.00 ± 0.018
11	Length of middle leg	12.04±0.019	13.50 ± 0.015
12	Length of hind leg	14.50±0.022	16.00 ± 0.020

* Data represent mean values of 10 measurements

Table 2: Distribution of some important species of *Pheropsophus hilaris*.

S. No.	Species	Distribution	Reference
1	<i>Pheropsophus sorbinus desbordesi</i> (Daindr.)	Assam	Roa and Manjunath (1984)
2	<i>P.sorbinus</i> (Dejean)	Assam	Roa and Manjunath (1986)
3	<i>P. stenoderus</i>	Assam	Manjunath <i>et al.</i> (1989)
4	<i>P.hilaris sorbinus</i> (Dejean)	Assam, Kashmir	Manjunath <i>et al.</i> (1998)
5	<i>P.bimaculatus</i> (Linn.)	Karnataka, Kerala, Andhrapradesh, Tamilnadu	Rajagopal <i>et al.</i> (1999)
6	<i>P. hilaris</i> (Fabr.)	Karnataka, Kerala, Andhrapradesh, Tamilnadu	Rajagopal <i>et al.</i> (1991)
7	<i>P.lissoderus</i> (Chauodoir)	Karnataka, Kerala, Andhrapradesh, Tamilnadu	Rajagopal <i>et al.</i> (2002)
8	<i>P.occipitalis</i> (Macleay)	Karnataka, Kerala, Andhrapradesh, Tamilnadu	Rajagopal <i>et al.</i> (2002)
9	<i>P.picicollis</i> (Chauodoir)	Karnataka, Kerala, Andhrapradesh,	Rajagopal <i>et al.</i> (2004)
10	<i>P.catoirei</i> (Dejean)	Karnataka, Kerala, Andhrapradesh,	Rajagopal <i>et al.</i> (1989)

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